SUMMARY.

Synoptic observations of hydrographic phenomena have been made during July and August of last summer at three different points on the west coast of Sweden. The results prove that internal movements closely resembling those found at Bornö occur practically simultaneously also at distant localities. These vertical displacements of the boundary are found to be closely related to simultaneous variations in the wind velocity, a fact which has also been proved by a separate investigation of the Bornö records for 1911. The establishment of a permanent system of synoptic observations in the sea found the coasts of Scandinavia is at present in progress.

APPENDIX.

The hydrostatic densimeter described in a preceding paper has been modified in the following details so as to be better adapted for localities where sufficiently deep water can only be attained at some distance from the shore, and also to be independant of temperatures far below freezing point. (Fig. 6.) The U tube of glass is mounted upside down with a corresponding change in the position of its air traps A, A, and communication tubes, to which the submerged tubes are attached. The latter are of lead, one-fourth inch wide, and are supported by bronze wires running along the whole length of the tubes so as to save them from the strain due to their own weight. About 1 meter below the surface there is a biconical brass vessel of about 1 liter inserted in each branch of the system. The upper half of these vessels is filled with liquid paraffin (black in the figure), colored red with a scarlet dyestuff insoluble in water, and the same fluid is contained in the upper part of the system from the vessels and upward. Only the lower half of the U tube itself is filled with a mixture of water and alcohol of the approximate density 0.85 (4 parts of water to 6 parts of alcohol) which serves as index fluid. The sensibility of the system may be varied by taking other concentrations of the water-alcohol mixture (within certain limits). The instrument is quite as easy to mount and to read as the type previously described.

NOTES ON THE FLUCTUATIONS OF MEAN SEA LEVEL IN RELATION TO VARIATIONS IN BAROMETRIC PRESSURE.

By Capt. T. BEDFORD FRANKLIN.

[Abstract from Jour. Scottish Met'l Soc., vol. 18, 1918, pp. 30-31.]

A study of the data from self-recording tide gauges at Dunbar, Newlyn, and Felixstowe by Col. Sir Charles Close brought him to the following conclusions:

1. That the effect of the local variation of pressure on sea level is opposite in sign to, and 13.25 times the magnitude of, the barometric variation—that is, the ratio is the same as the ratio of the specific gravity of mercury to that of sea water. [The actual ratio varies from about 7–20.]

2. That there is an annual tide—the cause at present unknown—having an amplitude of 6 inches, with a maximum in November and a minimum in April.

As suggested in 1914 by Prof. D'Arcy W. Thompson, the discrepancies between the tidal variation and barometric curves may be accounted for by considering atmospheric pressure and winds together. For Newlyn, by assuming that the effect of the wind either in piling up the water or in pushing it out to sea is proportional to its pressure in pounds per square foot, such that the effect in inches of sea level is about 1.5 times the inshore or offshore component of the wind pressure, it is possible to account closely for the differences between the hydrostatic and observed effects. This effect on seven occasions cited was 1 to 7.5 inches.

It would, therefore, appear that by applying the appropriate wind correction the two curves may be made very nearly to fall upon each other, and that for the limited period under observation—December, 1916, to June, 1917—*the sea level responded immediately to the combined influences of barometric pressure and wind.*

THE EFFECT OF WIND ON SEA-LEVEL.

[Extract from Nature (London) Feb. 13, 1919, p. 471.]

* * * Changes of level due to winds cause some fluctuation in individual estimates of the ratio (from 7 to 20, roughly), but not sufficiently to mask the close connection between sea-level and barometric pressure.

In a narrow landlocked sea, however, it might be expected that the wind would have relatively greater influence, and this is confirmed by a recent study of the Baltic sea level by Rolf Witting (*Öfv. af Finska Vet.-Soc. Förh.*, vol. lix, A, 13. Helsingfors, 1917). The purely hydrostatic effect of a gradient of barometric pressure over any region is to produce an opposite slope of the sea surface; but such a distribution of atmospheric pressure is usually accompanied by winds directed along the isobars, with the higher pressure on the left (in the Northern Hemisphere). This tends to heap up the waters with a gradient perpendicular to the former one, and in the Baltic this slope appears to be about 1.8 times as great as the hydrostatic slope. The resultant gradient is rather more than twice the latter and is inclined to it in azimuth at about 55°.

AN INSTRUMENT FOR ACCURATE AND RAPID DENSITY MEASUREMENTS ON BOARD SHIP.

By A. L. THURAS.

[Author's summary, from Journ. Wash. Acad. Sci., 1917, 7: 605-612, 2 figs.]

A simple apparatus is described by which the density of sea water can be measured on board ship with speed and precision. With carefully calibrated bobbins a density measurement of a liquid of known temperature coefficient can be made in less than 10 minutes to an accuracy of more than two in the fifth decimal place. The particular advantage of the method lies in the facts that (1) by changing the temperature of the liquid its density can easily and quickly be brought exactly to the density of the bobbin, and (2) at equilibrium temperature the sensitivity of the method is unaffected by the motion of the vessel, the liquid and bobbin having the same density.

AN ELECTRICAL INSTRUMENT FOR RECORDING SEA-WATER SALINITY.

By ERNEST E. WEIBEL and ALBERT L. THURAS.

[Author's summary, from Journ. Wash. Acad. Sci., 1918, 8: 145-153, 3 figs.]

An apparatus to give a continuous record of sea-water salinity by the measurement of its electrical conductivity is described. A pair of electrolytic cells has been designed which when used with a suitable alternating-current galvanometer will give satisfactory operation in connection with a recorder. The temperature compensation is obtained by placing both cells, which are in the